AMENDMENTS TO THE CLAIMS

The following listing of claims supersedes all previous versions.

Listing of the Claims

1. (Currently Amended) A method of detecting a random access channel preamble in a received uplink signal from a user, comprising:

spatially processing and temporally processing an uplink signal received at one or more receive antennas of a base station receiver and containing data related to a random access channel preamble to detect the random access channel preamble,

wherein temporal processing includes:

temporally correlating the received uplink signal to output at least one subcorrelation output signal,

determining, for each subcorrelation output signal, a decision statistic as the magnitude squared of the subcorrelation output signal, and

comparing a maximum of the determined decision statistics to a threshold value, the random access channel preamble of the uplink signal having been detected if the maximum decision statistic meets or exceeds the threshold value.

2. (Original) The method of claim 1, wherein the received uplink signal is subject to spatial processing prior to temporally processing the spatially processed signal.

3. (Currently Amended) The method of claim 1, wherein the received uplink signal is subject to temporal correlation prior to spatial processing of the ~~temporally correlated signal~~subcorrelation output signal.

4. (Currently Amended) The method of claim 1, wherein the received uplink signal further includes ~~information related to one or more of an amplitude of the uplink signal transmitted from a given user, a user specific preamble signature sequence of the given user and~~ a cell-specific scrambling code used in determining the spatially processed signal.

5. (Currently Amended) The method of claim 41, wherein

the received uplink signal further includes ~~a channel coefficient of a specified path for a given receive antenna,~~ a time delay of the specified path for the ~~given~~ user and a complex Gaussian noise component~~, and~~

~~the channel coefficient represents a beam formed by the given receive antenna in a given direction~~.

6. (Currently Amended) The method of claim 1, wherein spatial processing further includes multiplying the received uplink signal by a weight vector to determine the spatially processed signal.

7. (Original) The method of claim 6, wherein the weight vector is a function of a direction of the angle of arrival of the uplink signal and the number of receive antennas receiving the uplink signal.

8. (Original) The method of claim 1, wherein the one or more received antennas are configured as one of a single antenna, a pair a widely spaced antennas, a clustered linear array and a uniform linear array.

9. (Currently Amended) A method of determining a best cell portion for communicating with a user, the best cell portion being a portion of a cell where a received uplink signal from the user has a highest signal to interference ratio, comprising:

subjecting an uplink signal from a user that is received at one or more receive antennas and containing data related to a random access channel preamble to spatial processing and temporal processing to detect a random access channel preamble, the detected random access channel preamble indicative of the best cell portion for communicating with the user,

wherein temporal processing includes:

temporally correlating the received uplink signal to output at least one subcorrelation output signal,

determining, for each subcorrelation output signal, a decision statistic as the magnitude squared of the subcorrelation output signal, and

comparing a maximum of the determined decision statistics to a threshold value, the random access channel preamble of the uplink signal having been detected if the maximum decision statistic meets or exceeds the threshold value.

10. (Currently Amended) A method of detecting a random access channel preamble of a received uplink signal from a user in a communication system, comprising:

spatially processing an uplink signal received at one or more receive antennas of a base station receiver and containing data related to a random access channel preamble to output a spatially processed signal ~~based at least on angle of arrival of the uplink signal~~;

wherein spatial processing includes determining a spatially processed signal as a function of an amplitude of the uplink signal transmitted from the user, a user-specific preamble signature sequence, the total number of antennas at the base station receiver, and a channel coefficient of a specified path for a given receive antenna of the receiver, the channel coefficient representing a beam formed by the given receive antenna in a given direction, and

temporally processing the spatially processed signal to detect the random access channel preamble component.

11. (Currently Amended) The method of claim 10, wherein spatial processing further includes multiplying the received uplink signal by a weight vector that is a function of ~~at least~~ a direction of the angle of arrival of the uplink signal and the total number of receive antennas at the base station receiving the uplink signal ~~to determine the spatially processed signal~~.

12. (Currently Amended) The method of claim 11, wherein temporally processing of the spatially processed signal includes:

subjecting the spatially processed signal to temporal correlation to output at least one ~~subcorrelated~~ subcorrelation output signal that includes data related to one or more random access channel preamble signatures of a user, a channel coefficient representing a beam formed by the given receive antenna in a given direction toward the user, and transmitted chip energy of the preamble signatures;

~~calculating~~ determining, for each subcorrelation output signal, a decision statistic ~~from~~ as a magnitude squared of the ~~subcorrelated~~ subcorrelation output signal;

comparing a maximum of the calculated decision statistic[[s]] to a ~~given~~ threshold value; and

detecting a random access channel preamble if the maximum decision statistic equals or exceeds the ~~given~~ threshold value.

13. (Original) The method of claim 10, wherein spatial processing of the received uplink signal is performed using a direct implementation of spatial processing, using multiplication by weight vector and accumulation.

14. (Original) The method of claim 10, wherein spatial processing of the received uplink signal is performed using a Fast Fourier Transform (FFT) implementation.

15. (Cancelled)

16. (Currently Amended) A method of detecting a random access channel preamble in a received uplink signal from a user in a communication system, comprising:

subjecting an uplink signal received at one or more receive antennas and containing data related to a random access channel preamble to temporal correlation to output a subcorrelated signal based at least on angle of arrival of the uplink signal; and

spatially processing the subcorrelated signal to output a spatially processed signal, wherein spatial processing includes determining the spatially processed signal as a function of an amplitude of the uplink signal transmitted from the user, a user-specific preamble signature sequence of the user, the total number of antennas at the base station receiver, and a channel coefficient of a specified path for a given receive antenna of the receiver, the channel coefficient representing a beam formed by the given receive antenna in a given direction;

determining a decision statistic from the spatially processed signal;

comparing the decision statistic to a ~~given~~ threshold value; and

detecting a random access channel preamble if the decision statistic equals or exceeds the ~~given~~ threshold value.

17. (Currently Amended) The method of claim 16, wherein spatial processing includes multiplying the received uplink signal by a weight vector that is a function of ~~at least~~ a direction

of the angle of arrival of the uplink signal and the number of receive antennas receiving the uplink signal ~~to determine the spatially processed signal~~.

18. (Cancelled)

19. (Original) The method of claim 16, wherein spatial processing of the received uplink signal is performed using a direct implementation of spatial processing, using multiplication by weight vector and accumulation.

20. (Original) The method of claim 16, wherein spatial processing of the received uplink signal is performed using a Fast Fourier Transform (FFT) implementation.

21. (Cancelled)

22. (New) The method of claim 1, wherein spatial processing includes determining a spatially processed signal as a function of an amplitude of the uplink signal transmitted from the user, a user-specific preamble signature sequence of the user, the total number of antennas at the base station receiver, and a channel coefficient of a specified path for a given receive antenna of the receiver, the channel coefficient representing a beam formed by the given receive antenna in a given direction.

23. (New) The method of claim 9, wherein spatial processing includes determining a spatially processed signal as a function of an amplitude of the uplink signal transmitted from the user, a user-specific preamble signature sequence of the user, the total number of antennas at the base station receiver, and a channel coefficient of a specified path for a given receive antenna of the receiver, the channel coefficient representing a beam formed by the given receive antenna in a given direction.

24. (New) The method of claim 1, further comprising determining the threshold value so that as the number of antenna beams for a given angle of arrival of the received uplink signal increase, the threshold value increases so as to maintain a probability of false alarm over all antenna

beams to a desired value, wherein the probability of false alarm is a probability that the uplink signal is falsely detected when no random access channel preamble has been transmitted by the user.